REMARKS

Summary

Amended independent Claims 129, 133, 156, 158, 181 and 184 now even more clearly satisfy 35 U.S.C. § 112, second paragraph. In addition, these amended claims are understood to recite at least several features not disclosed or suggested by the patents to Politis and Long et al. Therefore, the application is now in allowable form.

Status of the Claims

Claims 34-36, 38-42, 69-122, 129, 130, 132-151, 155-176, and 180-186 are pending in the application, with Claims 34, 38, 69, 95, 121, 122, 129, 133, 156, 158, 181 and 184 being independent. Claims 129, 133, 156, 158, 181 and 184 have been amended. Support for these changes can be found in the original application, as set forth below. No new matter has been added.

Claims 34-36, 38-42 and 69-122 have been withdrawn from consideration as being directed to a non-elected invention. Applicant has retained these claims in order to preserve Applicant's rights. Should these claims need to be canceled in order to advance prosecution, the Examiner is requested to contact Applicant's representative.

Requested Action

Applicant respectfully requests the Examiner to reconsider and withdraw the outstanding objection and rejection in view of the foregoing amendments and the following remarks.

Formal Rejection

Claims 129, 130, 132-151, 155-176 and 180-186 are rejected under 35 U.S.C. §112, second paragraph, because the independent claims allegedly fail to specify the expression tree that remains unchanged and because the independent claims allegedly fail to indicate whether the active and clip regions are identical.

In response, while not conceding the propriety of the rejection, the independent claims have been amended. Applicant submits that as amended, these claims now even more clearly satisfy 35 U.S.C. §112, second paragraph. More specifically, those independent claims previously reciting an expression tree that remains unchanged have canceled such language therefrom. In addition, the independent claims have been amended to further specify the relationship between the active and clip regions.

For example, independent Claim 129 has been amended to recite an "expression tree comprising a plurality of nodes arranged in a hierarchical structure, each of said nodes representing one of the objects or a compositing operation for combining graphical objects or results of other compositing operations ". In addition, Claim 129 has been amended to recite that the "arrangement of nodes in the hierarchical structure remains stable during the creation of the image." Similar changes have been made to the other independent claims. These features are found, for example, in Figs. 5 and 8 of the present specification. Fig. 5 shows an expression tree in which the expression for the active region is shown next to each level, while Fig. 8 shows an optimal level activation table for the expression tree of Fig. 5, following the determination of the claimed effective regions for the expression tree of Fig. 5. As seen by a comparison of Figs. 5 and 8, the structure of the expression of Fig. 5 and the position of the operands in the expression

tree does not change in determining the effective regions for the expression tree, although the manner in which the operands of the compositing expression tree are composited is modified.

(In contrast, the patent to <u>Politis</u> is understood to teach that those portions of the expression tree whose bounding boxes have been minimized to be null, can be deleted from the expression tree (see column 18, lines 1 to 6 of the patent to <u>Politis</u>). Accordingly, the <u>Politis</u> patent is understood to teach away from the claimed limitation that the arrangement of nodes in the hierarchical structure remains stable during the creation of the image.)

In addition, Claim 129 has been amended to recite that "at least one of the clip regions determined for one of the compositing operation nodes being smaller in area than the active region for said one compositing operation node." And the other independent claims have been amended in a similar manner. This feature corresponds, for example, to Figures 5 and 6. As seen in Fig. 5 of the present specification, for the A node, the active region is A. However, as seen in Fig. 6, the clipping region for the A node is $A \cap ((B \cap C) \cup D)$. Accordingly, the clipping region for the node A is smaller than the active region for the node A. Similarly, as seen in Fig. 5, for the B node, the active region is B. However, as seen in Fig. 6, the clipping region for the B node is $(B \cap C)$. Accordingly, the clipping region for the node B is smaller than the active region for the node B.

In view of the above amendments to the independent claims, Applicant submits that the rejection under 35 U.S.C. § 112, second paragraph, has been overcome. Therefore, Applicant respectfully requests that this formal rejection be withdrawn.

Substantive Rejection

Claims 129, 130, 132-151, 155-176 and 180-186 are rejected under 35 U.S.C. §103 as allegedly being obvious over the patent to Politis in view of the patent to Long et al.

Response to Substantive Rejections

In response, while not conceding the propriety of the rejections, independent Claims 129, 133, 156, 158, 181 and 184 have been amended. Applicant submits that as amended, these claims are allowable for the following reasons.

A. The invention of Claim 129

Amended Claim 129 relates to a method of creating a pixel image. The pixel image is to be formed by rendering and compositing a plurality of graphical objects according to an expression tree representing a compositing expression for the image. At least one of the graphical objects is non-rectangular. The expression tree comprising a plurality of nodes arranged in a hierarchical structure. Each of the nodes represents one of the objects or a compositing operation for combining graphical objects or results of other compositing operations. Each of the graphical objects has a predetermined object outline forming a region comprising a plurality of pixels therein.

The method comprises the step of determining an active region for each of the graphical object nodes, the active regions for each particular graphical object node being equal to the region inside the predetermined object outline for the graphical object represented by the particular graphical object node.

The method also comprises the step of determining an active region for each of the compositing operation nodes, the active region for each particular compositing operation node being determined based on the active regions of each child node of the particular compositing operation node.

The method further comprises the step of determining a clip region for each of the compositing operation nodes. The clip region for each particular compositing operation node is equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node. At least one of the clip regions determined for one of the compositing operation nodes is smaller in area than the active region for the one compositing operation node.

In addition, the method comprises the step of determining an effective region for each of the compositing operation nodes. The effective region for each particular compositing operation node is equal to the intersection of the clip region of the particular compositing operation node and the active regions of the child nodes of the particular compositing operation node. At least one of the effective regions determined for one of the compositing operation nodes is a smaller in area than the clip region for the one compositing operation node.

Further, the method comprises the step of applying the compositing operation represented by each operation node to the pixels falling wholly within the corresponding effective region for the operation node to create the image, wherein pixels falling outside the effective regions are disregarded in applying the compositing operations and the arrangement of nodes in the hierarchical structure remains stable during the creation of the image.

To reject this claim, the Office Action cites the Politis patent to show the four claimed determining steps and cites the combination of the Politis and Long et al. patents to show the claimed applying step of Claim 129. But, Applicant submits that the Office Action fails to establish that the Politis and/or Long et al. patents disclose or suggest the four claimed determining steps or the claimed applying step of Claim 129, as required by MPEP § 2142. In addition, Applicant submits that the Office Action fails to establish that there is "some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings" to produce the applying step recited by amended Claim 129, as also required under MPEP § 2142. For these reasons, the Patent Office is not understood to have satisfied its burden of proof to establish a prima facie case of obviousness, as will be discussed below.

1.   The step of determining an active region for each of the graphical object nodes, the active regions for each particular graphical object node being equal to the region inside the predetermined object outline for the graphical object represented by the particular graphical object node

Pages 4 and 5 of the Office Action state that Fig 22 of the patent to Politis 1) "illustrates element 60 as a graphical object that corresponds to Applicant's definition of an active region", and 2) "illustrates a graphical 60 is immediately clipped against the borders of graphical element 61 to produce the final output 64, item 64 is an active region". Then, page 5 of the Office Action concludes that "A person skilled in the art could see the similarity in fig. 22 of the reference and the Applicant claim languages".

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But, column 15, lines 42 to 45 of the Politis patent states that "Referring now to Fig. 19, the desired operation to be performed is "square in circle", where "square" represents the graphical element 60 and "circle" represents the graphical element 61". And, column 15, lines 53 to 57 of the patent to Politis states that "In Fig. 22, there is shown a more efficient method of performing the operation of Fig. 19. In this case, the graphical element 60 is immediately clipped against the borders of graphical element 61 to produce the final output 64". Accordingly, Fig. 22 and the related disclosure are understood to merely suggest the clipping of one object against the borders or outline of another object.

Thus, Fig. 22 and the above disclosure of the Politis patent are not understood to disclose or suggest, and indeed are distinctly different from the step of "determining an active region for each of the graphical object nodes, the active region for each particular graphical object node being equal to the region inside the predetermined object outline for the graphical object represented by the particular graphical object node", as recited by amended Claim 129. Rather, the patent to Politis is understood to teach away from this active-region determining step. For example, column 13, lines 56 to 58 of the Politis patent discloses that for each of the leaf nodes 28-32 (i.e., the claimed graphical object nodes), the bounding box of the graphical element which is to be rendered is first calculated. But, a bounding box is understood to be only an approximation to the outline of an object. Thus, the bounding box 31 for the circle of Fig. 17 is only an approximation to the outline of the circle. The outline of the bounding box 31 of the circle is not understood to define a region inside a predetermined object outline. Therefore, the outline of the bounding box 31 is not understood to satisfy the definition of the active region as recited in amended Claim 129.

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Since the Office Action is not understood to have established that the Politis patent

discloses or suggests the active-region determining step recited by amended Claim 129,

Applicant submits that the Office Action has not established a prima facie case of obviousness

against amended Claim 129, since MPEP § 2142 requires the cited art to disclose or suggest each

of the claimed features to establish a prima facie case of obviousness. For this reason, Applicant

respectfully requests that the rejection of Claim 129 be withdrawn.

2.   The step of determining an active region for each of the compositing
       operation nodes, the active region for each particular compositing
       operation node being determined based on the active regions of each child
       node of the particular compositing operation node

The Office Action also cites Fig. 22 of the Politis patent and the item 64, which the

Office Action states is produced by clipping the graphical element 60 against the borders of the

graphical element 61, to show claimed compositing-operation node, active-region determining

step.

But, as noted above, Fig 22 and the related disclosure in the patent to Politis are merely

understood to show the clipping of one object against the borders or outline of another object.

The Office Action does not point to any portion of the patent to Politis that discusses the

determining of an active region for each of the compositing operation nodes, the active region for

each particular compositing operation node being determined based on the active regions of each

child node of the particular compositing operation node, as recited by amended Claim 129. The

only references to "child nodes" found by Applicant in the patent to Politis are: at column 8, lines

21 to 23, which states that "[t]he expression tree node created records the operation or operator,

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and the children of the expression tree node are the operands of the operation"; at column 14, lines 29 to 36, which states that "[t]his process is carried on recursively, so that a child's new bounding box is used to intersect, or minimize, its descendant's bounding boxes ... A preorder traversal involves visiting the current node first and then its left and right children"; and at column 14, lines 53 to 57, which states that "The intersection of the bounding box areas 48, 29 is a null area which means that the node 50 does not form part of the final image. Therefore, this node (and its children, if any) can be deleted from the overall expression syntax tree, with the resulting tree taking a simplified form." But these references to child nodes are not understood to constitute a disclosure of the determining of an active region for each of the compositing operation nodes, the active region for each particular compositing operation node being determined based on the active regions of each child node of the particular compositing operation node, as recited by amended Claim 129.

Therefore, the Office Action is not understood to have established that the Politis patent discloses or suggests the compositing-operation node, active-region determining step recited by amended Claim 129. Accordingly, Applicant submits that for this additional reason, the Office Action has not established a prima facie case of obviousness against amended Claim 129, since MPEP § 2142 requires the cited art to disclose or suggest each of the claimed features to establish a prima facie case of obviousness. For this additional reason, Applicant respectfully requests that the rejection of Claim 129 be withdrawn.

3.   The step of determining a clip region for each of the compositing operation nodes, the clip region for each particular compositing operation node being equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node, at least one of the clip regions determined for one of the compositing operation nodes being smaller in area than the active region for the one compositing operation node

Page 5 of the Office Action appears to cite Fig. 22 and item 61 to show the claimed clip-region determining step. But the Office Action fails to discuss in any detail, the portions of the Politis patent showing the specific features of this step, i.e., "determining a clip region for each of the compositing operation nodes, the clip region for each particular compositing operation node being equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node, at least one of the clip regions determined for one of the compositing operation nodes being smaller in area than the active region for the one compositing operation node ".

In addition, the Politis patent merely discloses, as discussed at column 13, lines 58 to 65: "Subsequent to the calculation of the bounding boxes of the leaf nodes, the bounding boxes of internal nodes are calculated. After the calculation of the bounding box 27 of the internal node 26, the bounding boxes 27-28 can be combined 34 again utilizing the over operator. Similarly, bounding box 35 is the combination of bounding boxes 29 and 34 utilizing the over operator 37." Further, the only mention Applicant found of parent nodes in the patent to Politis is at column 14, lines 25 to 29, where Politis states that "The second stage or pass of bounding box minimization involves a depth first preorder traversal of the syntax expression tree. In the second pass, the bounding box of each internal node's descendants is intersected by the bounding

box of the parent." But, these portions of the <u>Politis</u> patent are not understood to constitute a disclosure of the clip region for each particular compositing operation node being equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node, as recited by amended Claim 129.

The Examiner states at page 5 of the Office Action that "Politis in fig. 22 illustrates that the graphical element 64 (i.e., an effective region) is <u>generally</u> a proper subset of the clipping region, in this case, it covers a whole set of clipping region." (emphasis in the original) However, the graphical element 64 <u>is understood to be equal to</u> the graphical element 61 which the Examiner asserts is the same as the claimed clipping region. Accordingly, the graphical element 64 is not understood to be "smaller in area than" the graphical element 61. Therefore, this portion of the <u>Politis</u> patent is not understood to disclose or suggest that at least one of the clip regions determined for one of the compositing operation nodes is smaller in area than the active region for the one compositing operation node, as recited by amended Claim 129.

Thus, the Office Action is not understood to have established that the <u>Politis</u> patent discloses or suggests the clip-region determining step recited by amended Claim 129. Accordingly, Applicant submits that for this additional reason, the Office Action has not established a prima facie case of obviousness against amended Claim 129, since MPEP § 2142 requires the cited art to disclose or suggest each of the claimed features to establish a prima facie case of obviousness. For this additional reason, Applicant respectfully requests that the rejection of Claim 129 be withdrawn.

4.   The step of determining an effective region for each of the compositing operation nodes, the effective region for each particular compositing operation node being equal to the intersection of the clip region of the particular compositing operation node and the active regions of the child nodes of the particular compositing operation node, at least one of the effective regions determined for one of the compositing operation nodes being a smaller in area than the clip region for the one compositing operation node

Page 6 of the Office Action does not discuss in any detail the portions of the Politis patent showing this effective-region determining step. Rather, page 6 of the Office Action merely states that Applicant allegedly does not specify boundaries of the active, clip, and effective regions, that Appendix B shows that the active and clip regions are similar, and that the Politis patent does not illustrate the compositing expression for rendering as illustrated by Applicant in Appendix B. Applicant submits that such a discussion does not constitute an identification of the portions of the Politis patent that disclose the step of determining an effective region for each of the compositing operation nodes, the effective region for each particular compositing operation node being equal to the intersection of the clip region of the particular compositing operation node and the active regions of the child nodes of the particular compositing operation node, at least one of the effective regions determined for one of the compositing operation nodes being a smaller in area than the clip region for the one compositing operation node, as recited by amended Claim 129.

Page 28, lines 25 to 29 of the original specification describe that the effective regions for each node in an expression tree representing the image are calculated by setting the effective region to the intersection of the active regions of the node's operands and the node's clipping region, if the node is an operation node. Page 24, lines 22 to 23 of the specification describes

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that the effective region of an operation is generally not the same as the clipping region of the sub-expression that the operation forms the root of. The effective region is usually a proper subset of (i.e., not equal to) the clipping region of the sub-expression. Thus, the effective region of an operation is generally not the same as the clipping region of the sub-expression that the operation forms the root thereof. Accordingly, the effective region is smaller in area than the corresponding clipping region. For example, for the expression trees of Figs. 5, 6 and 7 of the present specification, Fig. 6 shows that the clipping region of the "over" operation node is $(B \cap C) \cup D$. As seen in Fig. 7, the effective region of the "over" operation node is $(B \cap C) \cap D$. As previously discussed, the effective region for the "over" operation is not equal to the clipping region for the "over" operation and is indeed a proper subset thereof. Accordingly, the effective region for the "over" operation is smaller in area to the clipping region for the "over" operation.

The Examiner states at page 5 of the Office Action that "Politis in fig.22 illustrates that the graphical element 64 (i.e., an effective region) is generally a proper subset of the clipping region, in this case, it covers a whole set of clipping region. " But, the graphical element 64 is understood to be equal to the graphical element 61 which the Examiner asserts is the same as the claimed clipping region. Accordingly, the graphical element 64 is not "smaller in area than" the graphical element 61. Therefore, this portion of the Politis patent is not understood to disclose or suggest that at least one of the effective regions determined for one of the compositing operation nodes is smaller in area than the clip region for the one compositing operation node, as recited by amended Claim 129.

Thus, the Office Action is not understood to have established that the Politis patent discloses or suggests the effective-region determining step recited by amended Claim 129.

Accordingly, Applicant submits that for this additional reason, the Office Action has not established a prima facie case of obviousness against amended Claim 129, since MPEP § 2142 requires the cited art to disclose or suggest each of the claimed features to establish a prima facie case of obviousness. For this additional reason, Applicant respectfully requests that the rejection of Claim 129 be withdrawn.

> 5. The step of applying the compositing operation represented by each operation node to the pixels falling wholly within the corresponding effective region for the operation node to create the image, wherein pixels falling outside the effective regions are disregarded in applying the compositing operations and the arrangement of nodes in the hierarchical structure remains stable during the creation of the image

Claim 129 has been amended to recite that the arrangement of nodes in the hierarchical structure remains stable during the creation of the image. The specification shows this feature, for example, in Figures 5 and 8. As shown in Fig. 5, an expression tree is provided in which the expression for the active region is shown next to each level. Fig. 8 shows an optimal level activation table for the expression tree of Fig. 5, following the determination of the claimed effective regions for the expression tree of Fig. 5. As seen by a comparison of Figs. 5 and 8, the structure of the expression of Fig. 5 does not change in determining the effective regions for the expression tree. Accordingly,

In contrast, as discussed above, the patent to Politis is understood to teach that those portions of the expression tree whose bounding boxes have been minimized to be null, and can be deleted from the expression tree (column 18, lines 1 to 6). Accordingly, the patent to Politis is understood to teach away from the claimed feature "said arrangement of nodes in said

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hierarchical structure remains stable during the creation of said image" as recited by amended Claim 129. In addition, the patent to Long et al. is also not understood to disclose or suggest the step of applying the compositing operation represented by each operation node to the pixels falling wholly within the corresponding effective region for the operation node to create the image, wherein pixels falling outside the effective regions are disregarded in applying the compositing operations and the arrangement of nodes in the hierarchical structure remains stable during the creation of the image, as recited by amended Claim 129.

Since MPEP § 2142 requires the cited art to disclose or suggest all of the claimed features, and since the patents to Politis and Long et al. are not understood to disclose or suggest at least one feature of amended Claim 129, the Office is not understood to have yet established a prima facie case of obviousness against amended Claim 129. For this additional reason, Applicant respectfully requests that the rejection of Claim 129 be withdrawn.

In addition, the Office Action makes a variety of statements about the Long et al. and Politis patent, and concludes that it would be obvious to combine the teachings of these patents to produce the applying step recited by Claim 129. Applicant respectfully disagrees with many of these statements and the Office Action's conclusion for the following reasons.

Page 5 of the Office action states that "If a person skill in the art does not run the method of optimizing, the expression tree remains unchanged." However, the Office Action has not established that the patent to Politis or the skilled artisan reading the patent to Politis would not run the method of optimizing disclosed by Politis. In fact, if the optimization of the Politis patent is not run, the efficiency of the rendering process is not understood to be increased, and this

benefit of the <u>Politis</u> patent is not understood to be realized. Therefore, Applicant understands that one skilled in the art would run the optimizing method.

Page 6 of the Office Action states that "Politis does not illustrate the compositing expression for rendering as Applicant illustrated in Appendix B or figs. 5 - 7." And for this reason, page 7 of the Office Action cites the <u>Long et al.</u> patent: "Long in fig. 19 illustrates an unchanged structure of an expression tree, that can be interpreted as active region (Op2), clip region (Op1) and effective region as an over operation."

But, Applicant submits the Op2 is an operator, not an active region. For example, as stated at column 31, lines 39 to 40 of the patent to <u>Long et al.</u>,"The next level in the activity table 820 is formed by the left leaf node A, and its corresponding operator Op2." Similarly, Op1 is understood to be the operator of the right leaf node C and "over" is understood to be the compositing operation at the root node of the expression tree of Fig. 19.

In addition, the patent to <u>Long et al.</u> is not understood be directed to the particular problem with which the present application and the present inventor is concerned. The present invention is concerned, among other goals, with reducing the per-pixel cost of evaluating the set of compositing operations required to compute an expression tree representing the composition of graphical objects. In contrast, the patent to <u>Long et al.</u> is understood to be directed to rendering graphical objects <u>without the use of frame or line storage</u> of the pixel data as part of the rendering process. As a result, the patent to <u>Long et al.</u> is not understood to disclose, suggest, or in any way relate to a method for reducing the per-pixel cost of evaluating the set of compositing operations required to compute an expression tree. Therefore, there would be no motivation to combine the teachings of the patents to <u>Long et al.</u> and <u>Politis</u> in such a way as to reduce the per-pixel cost of

evaluating the set of compositing operations required to compute an expression tree by producing

the applying step recited by amended Claim 129.

Moreover, even assuming arguendo, that it would be obvious to combine the patents to

Long et al. and Politis, the resulting combination would still not produce the feature of applying

the compositing operation represented by each operation node to the pixels falling wholly within

the corresponding effective region for the operation node to create the image, wherein pixels

falling outside the effective regions are disregarded in applying the compositing operations and

the arrangement of nodes in the hierarchical structure remains stable during the creation of the

image, as recited by amended Claim 129. This can be seen as follows.

The patent to Politis states at col. 6, lines 40 and 41 that "[a]ny pixel outside the boundary

of a graphical element is treated as being fully transparent". In addition, the Politis patent also

states at col. 6, lines 44 to 47 that "some special operations always require the color to be

defined, so fully transparent pixels take up a color as represented by the zero components in the

rendering color space." Accordingly, even though any pixel outside the boundary of a graphical

element is understood to be treated by the Politis patent as being fully transparent, these pixels

are understood to still require a color in order to allow them to be composited. Further, columns

13, 14, and 15 of the patent to Politis are understood to teach that bounding boxes are combined

using compositing operations. Therefore, the Politis patent is understood to teach that some

pixels that are outside the actual outline (or boundaries) of an object and that are considered fully

transparent, are composited. Thus, the Politis patent is understood to teach directly away from

the claimed limitation that "pixels falling outside the effective regions are disregarded in

applying the compositing operations ... during the creation of said image", as recited by amended

Claim 29. In addition, the patent to <u>Long</u> is also not understood to disclose or suggest this feature. Therefore, even if these patents are combined, the invention of amended Claim 129 is still not understood to be produced.

Since the applied art is not understood to disclose or suggest the applying step of amended Claim 129 and since the Office Action is not understood to have provided the required motivation under MPEP § 2142 and §2143 to combine the art to produce the invention of amended Claim 129, Applicant submits that for this additional reason, the Office has not yet established a prima facie case of obviousness against amended Claim 129. For these additional reasons, Applicants respectfully request that the rejection of Claim 129 be withdrawn.

B. Independent Claims 133, 156, 158, 181 and 184

Independent Claims 133, 156, 158, 181, and 184 recite features similar or corresponding to those of Claim 129 discussed above, and are allowable for at least the same, similar, or corresponding reasons.
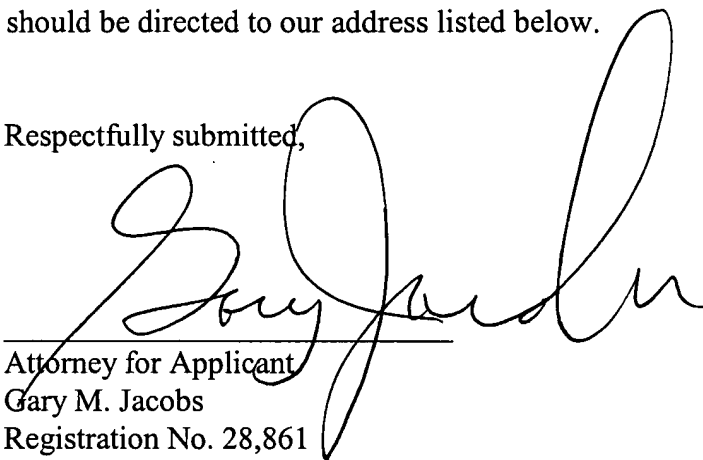
C. Dependent Claims

Dependent claims 130, 132, 134-151, 155, 157, 159-176, 180, 182, 183, 185 and 186 also are allowable for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Individual consideration of each dependent claim is requested.

Conclusion

In view of the above amendments and remarks, the application is now in allowable form.

Therefore, early passage to issue is respectfully solicited.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

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